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BOTANY

The Search for Mutations.—Few are inclined to doubt the reality of the mutations observed by DeVries in the cultivated evening primrose, but many have questioned whether these changes occur at all frequently in nature. The search for them has been active since the publication of *Die Mutationstheorie*.

Cockyane (*New Phyt.*, 6: 43–46, 1907) describes pink, rose pink, and even bright rose forms of *Leptospermum scoparium*. So far as he was able to determine these color varieties must have originated in single individuals by discontinuous variation.

Cockerell (*Bot. Gaz.*, 43: 283–284, 1907) reports that near Boulder, Colorado, *Euphorbia corollata* has only four glands instead of the five normal to the species. No plants with five were seen.

Rehder (*Bot. Gaz.*, 43: 281–282, 1907) records the discovery in British Columbia of a fine specimen of *Rhododendron albiflorum* with double flowers. There was petalody of the stamens and carpels, with a considerable increase in their number. Only a single, imperfectly developed anther was found. Wild rhododendrons with double flowers are rare; in the Alps *R. ferrugineum* with double flowers has been observed at least twice.

Focke (*Abh. naturw. Ver., Bremen*, 19: 74–75, 1907) announces the gradual change of *Datura tatula* to *D. stramonium*. The offspring of typical *D. tatula* became weaker and paler from year to year until finally vigorous *D. stramonium* plants were produced from the seed of the weaklings. Since the methods of culture and pollination are not given in detail these results cannot be accepted without verification. The author records also a number of variations which some might class as mutations.

In connection with the recent discussions of geographic isolation in the *American Naturalist*, the observations of Schaffner are of interest (*Ohio Naturalist*, 7: 41–44, 1906). He discovered a new variety of *Verbena stricta* growing in Clay County, Kansas, distributed over somewhat more than a square mile of territory and represented by thousands of specimens. The new form is characterized by a pinkish white corolla, and among many thousands of specimens no transitional forms were found. In some spots the new form was more abundant; in others the parent species predominated; and elsewhere the two

forms were about equally represented. Schaffner considered this unquestionably a mutation, and points to the significance of the fact that it has been able to persist and spread without any geographic isolation whatever.

The observations of Druery (*Journ. Roy. Hort. Soc.*, 31: 77-83, 1906) on the wild sports of British ferns are also pertinent. He records a case in which the cristate form of *Pteris aquilina* was found covering an area of several acres, having apparently superseded the normal form in this one locality. Druery has devoted much attention to the collection and cultivation of the wild sports of British ferns. The British Isles are particularly rich in these sports of extremely divergent character and often of great beauty. About 1200 wild forms have been catalogued as distinct although only some 40 species are listed for the flora, and the majority of these have sported only rarely. Most of the ornamental forms cultivated in gardens have originated in nature and not under the influence of cultural conditions. The spores collected from wild plants yield the anomaly in its full development, or in three generations at the most, so that there can be no suggestion of a gradual development by the selection of minute variations. In nature the aberrant and the typical forms are found growing together but no intermediates are to be seen.

Shull (*Science*, n. s. 25: 590-591, 1907) has been occupied for some time with pedigree experiments on the common shepherd's purse and now announces results of great interest based upon the examination of over 20,000 pedigreed individuals. Four elementary forms have been discovered which breed true when self fertilized or crossed within the limits of the same elementary species. Upon crossing, these forms hybridize in strictly Mendelian fashion. Other atypic forms which appeared in the cultures breed true to their characteristics and do not show Mendelian segregation, but Dr. Shull is unwilling to advance them as mutants since they were not produced from the seed of guarded flowers. Shull (*loc. cit.*) and Transeau (*Science*, n. s. 25: 269-270, 1907) both point out the significance of Mendelian hybridization in the persistence and migration of a newly arisen type. The recessive form is at no disadvantage from crossing with the parent in these cases but sometimes probably has the advantage.

Zoologists are more cautious than botanists in accepting the mutation theory. Whitman has recently criticized it (*Bull. Wisc. Nat. Hist. Soc.*, n. s. 5: 6-14, 1907). Duerden (*Rec. Albany Mus.*, 2: 65-96, 1907) in his studies of the genesis of color patterns in tortoises concludes that the color patterns must have arisen by gradual modification and not by sudden transformation. Ortman (*Mem. of the*

Carnegie Mus., 2:343-524, 1906) studied the crawfishes of Pennsylvania and states that "anything that looks like a 'mutation' in de Vries's sense is entirely unknown." Closely allied species either have distinct geographical distributions or if found in one locality they prefer different habitats.

W. D. Tower is of the opinion that "the evolution of the genus *Leptinotarsa* and of animals in general has been continuous and direct, developing new species in migrating races by direct response to the conditions of existence" (*Carnegie Inst.*, Publ. 48). He states that "there is not at present evidence to show the origin of any heritable variations in the soma"; and that "in these beetles we can get new permanent variations by stimulating the germ cells and in no other way." Such an inheritable character he produced artificially by subjecting adult beetles to abnormal conditions of temperature, moisture, and barometric pressure. The eggs produced and developing under these conditions give rise to new forms which breed true even under normal conditions. But the parent beetles when restored to normal conditions produce offspring of the original type. The new forms are therefore believed to be due to influences of environmental conditions on the germ plasm. F. E. Lutz of the Cold Spring Harbor Station has reviewed Dr. Tower's work from the mutationist's point of view, as follows (*Canadian Ent.*, 39: 176-179, 1907),—

"The author maintains that 'mutation is not a special kind of variability different from that of ordinary fluctuating variation, but it is a part of the normal variability, and the direct response of the germ plasm to stimuli.' He finds that 'extreme variates' are rare, occurring only once in 6,000 cases; and they *breed true*, a thing which ordinary variates do not do. This is my idea of a mutant.... The fact is, Tower has given us one of the strongest arguments for the importance of mutations that has ever been presented. He says,—'The breeding 'mutants' in our gardens and laboratories cannot tell us how they would succeed in nature; my experience with these beetles is that they fare badly, and, as far as I can discover, that they play a minor role in the evolution of species.' However, he had already stated that not only did *pallida*, one of the 'mutants,' breed absolutely true for six generations in the laboratory with 'no tendency to revert to the parental species' (*decemlineata*), but that from 14 males and 15 females allowed to shift for themselves in nature, 1,580 *pallida* offspring of the 6th generation were found, and he 'felt that further experiment with this form unconfined in nature was neither safe nor desirable, and exterminated the entire lot.' It is true that 29 *pallida* are more than he ever found in nature at one time and place, but he did find 6 at Clifton,

Ohio, and he noted that occasionally, as at Cabin John Bridge, Md., in 1900, sports are relatively very abundant . . . If I had been so fortunate as to obtain his results, I would have drawn quite the opposite conclusions, and would have supported the mutation theory most loyally. . . .”

Aigner-Abafi (*Ann. Hist.-Nat. Mus. Nat. Hung.*, 4: 484-531, 1906) describes aberrations or varieties of 113 forms of Lepidoptera, many of which are figured. He aims to include only such as may be of interest to the student of evolution, but offers no suggestions as to their phylogeny which, he believes, should follow experimental researches. He considers that a knowledge of these forms collected in nature will be of great interest in connection with their production by experimental means.

Melanism has received particular attention among mutationists. Porritt (*Rep. Brit. Ass.*, 76: 316-332, 1907) has given a detailed account of the increase of melanism in Yorkshire Lepidoptera. The author confines himself strictly to recording the facts, some of which seem to support the mutation theory although others do not.

In all these cases it is observed that zoologists are cautious about applying the term *mutant* to variations found in nature. Although the teratological studies so popular a few years ago have gained a new significance through the discoveries of De Vries, real progress lies only in the cultivation of these aberrant forms and the recording of their behavior in successive generations under guarded conditions.

J. A. HARRIS.

Biology in the Journal of Agricultural Science.—Although the real progress of science cannot be properly estimated by the counting of titles of journals, some notion of the interest which is being shown in scientific matters and of the degree to which specialization has extended may be had from this very source. The appearance of the new *Journal of Agricultural Science* indicates that another field of research has become enlarged, and that this division of applied science acquires a more direct means of spreading its benefits.

The purpose of the journal is to afford a “general channel for the publication and discussion of papers bearing on agriculture.” Papers on zoology, botany, bacteriology, chemistry physics or geology are accepted if they have a bearing upon the definitely scientific problems of agriculture, but no papers dealing with matters of an ordinary commercial or farming character as distinct from agricultural science are to be admitted. The first six numbers of the journal, fine specimens of the product of the Cambridge press, are now at hand.